Claims 1, 2, 3, 11, 13, 14, 15 and 23 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher et al. in view of Katoh. This rejection is respectfully traversed.

Independent Claims 1 and 13 recite a thickness of a transfer barrier layer is at least one order of magnitude greater than a thickness of a quantum well.

In the previous response filed January 7, 2003, arguments were presented that a layer disclosed in Rosencher et al. having a thickness of 200 A is in the same order of magnitude as a layer having a thickness of 80 A, and therefore the prior art does not teach or suggest a thickness of a transfer barrier layer being at least one order of magnitude greater than a thickness of a quantum well.

In response to these arguments, the outstanding Office Action indicates at page 6, item 7, that 200 A can be written as 2×10^2 and 80 A can be written as 8×10^1. Further, the outstanding Office Action compares the power of ten (2) of the first number with the power of ten (1) of the second number and concludes that 200 is at least one order of magnitude greater than 80 (2-1=1).

However, as shown in Appendix A, when comparing the order of magnitude of two different numbers, those numbers should be rounded off to the nearest power of ten. R. A. Serway and R. J. Beichner specifically show in "Physics for Scientists and Engineers," (Fifth Edition, 2000), at page 13, that "... if a quantity is given as 3×10^3, we say that the order of magnitude of that quantity is 10^3 ... [l]ikewise, the quantity $8 \times 10^7 \sim 10^8$."

Accordingly, the thicknesses 80 and 200 compared in the outstanding Office Action are written as 8.0×10^1 and 2.0×10^2, respectively. Further, when the two numbers are rounded to the nearest power of ten, these two numbers become $10 \times 10^1 = 10^2$ and 10^2, respectively. Therefore, 80 and 200 are in the same order of magnitude. The same argument applies to layers having thicknesses of 5 and 20 A, as identified in the outstanding Office Action also at page 6, item 7.

In addition, the following example shows that the interpretation of same order of magnitude provided in the outstanding Office Action at page 6, item 7, is incomplete. If the numbers 99 and 100 are written according to the interpretation provided in the outstanding Office Action as 9.9×10^1 and 10^2, respectively, it follows that 100 is at least one order of magnitude greater than 99. However, the difference between 99 and 100 is less then 1%. Thus, the interpretation given to an order of magnitude appears to be mistaken in the outstanding Office Action.

Accordingly, it is respectfully submitted that independent Claims 1 and 13 and each of the claims depending therefrom patentably distinguish over the applied art.

Claims 6, 12, 18 and 34 were rejected under 35 U.S.C. § 103(a) as unpatentable over Rosencher et al. and Katoh in view of Nanbu. This rejection is respectfully traversed.

Claims 6, 12, 18 and 24 depend either directly or indirectly on independent Claims 1 and 13, which as discussed above are believed to be allowable. Further, Katoh and Nanbu also do not teach or suggest the claimed features. Therefore, it is respectfully requested this rejection also be withdrawn.

Consequently, in light of the above discussion, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Gregory J. Maier
Attorney of Record
Registration No. 25,599
David A. Bilodeau
Registration No. 42,325

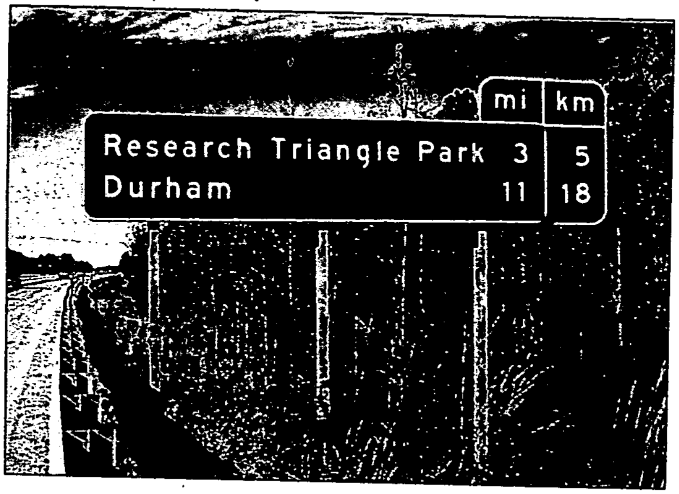
RECEIVED
MAY 21 2003
TECHNOLOGY CENTER 2800

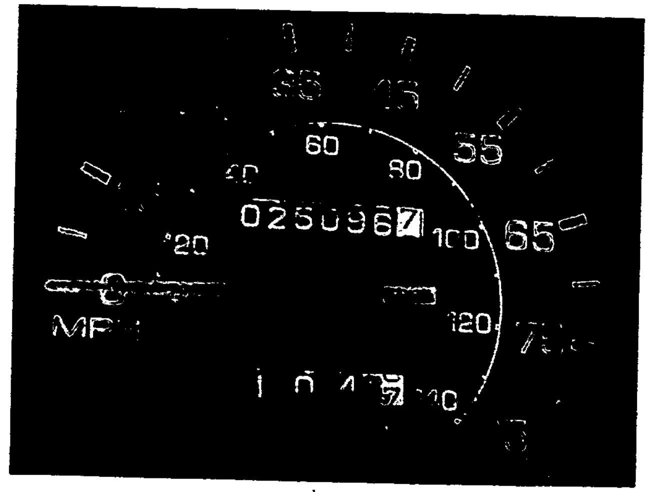
22850

Tel.: (703) 413-3000
Fax: (703) 413-2220
GJM/DAB/RFF:kst

I:\atty\Rff\0s\0154\01542811\01542811-req.doc

S/N: 09/328,39





(Left) This road sign near Raleigh, North Carolina, shows distances in miles and kilometers. How accurate are the conversions? *(Billy E. Barnes/Stock Boston).*

(Right) This vehicle's speedometer gives speed readings in miles per hour and in kilometers per hour. Try confirming the conversion between the two sets of units for a few readings of the dial. *(Paul Silverman/Fundamental Photographs)*

EXAMPLE 1.4 The Density of a Cube

The mass of a solid cube is 856 g, and each edge has a length of 5.35 cm. Determine the density ρ of the cube in basic SI units.

Solution Because 1 g = 10^{-3} kg and 1 cm = 10^{-2} m, the mass m and volume V in basic SI units are

$$m = 856\text{ g} \times 10^{-3}\text{ kg/g} = 0.856\text{ kg}$$

$$V = L^3 = (5.35\ \cancel{\text{cm}} \times 10^{-2}\text{ m}/\cancel{\text{cm}})^3$$
$$= (5.35)^3 \times 10^{-6}\text{ m}^3 = 1.53 \times 10^{-4}\text{ m}^3$$

Therefore,

$$\rho = \frac{m}{V} = \frac{0.856\text{ kg}}{1.53 \times 10^{-4}\text{ m}^3} = 5.59 \times 10^3\text{ kg/m}^3$$

1.6 ESTIMATES AND ORDER-OF-MAGNITUDE CALCULATIONS

It is often useful to compute an approximate answer to a physical problem even where little information is available. Such an approximate answer can then be used to determine whether a more accurate calculation is necessary. Approximations are usually based on certain assumptions, which must be modified if greater accuracy is needed. Thus, we shall sometimes refer to the order of magnitude of a certain quantity as the power of ten of the number that describes that quantity. If, for example, we say that a quantity increases in value by three orders of magnitude, this means that its value is increased by a factor of $10^3 = 1000$. Also, if a quantity is given as 3×10^3, we say that the order of magnitude of that quantity is 10^3 (or in symbolic form, $3 \times 10^3 \sim 10^3$). Likewise, the quantity $8 \times 10^7 \sim 10^8$.

The spirit of order-of-magnitude calculations, sometimes referred to as "guesstimates" or "ball-park figures," is given in the following quotation: "Make an estimate before every calculation, try a simple physical argument . . . before every derivation, guess the answer to every puzzle. Courage: no one else needs to